REPORT ON AN OUTBREAK OF CANINE PIROPLASMOSIS DUE TO *PIROPLASMA GIBSONI* (PATTON) AMONG THE HOUNDS OF THE MADRAS HUNT, TOGETHER WITH SOME OBSERVATIONS ON THE TREATMENT OF THE DISEASE WITH SALVARSAN

BY

MAJOR T. H. SYMONS, I.M.S., M.F.H.;
SECOND SURGEON, GENERAL HOSPITAL, MADRAS

AND

CAPTAIN W. S. PATTON, I.M.S.,
KING INSTITUTE

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In an earlier paper, one of us recorded the discovery of a new piroplasm, *P. gibsoni* (Patton), which was found in the blood of the hounds of the Madras Hunt, and later was proved to be common in the blood of the jackal (*Canis aureus*). It will be remembered that it was then shown that *Piroplasma gibsoni* differs in structure from *Piroplasma canis*, in that it is much smaller, and that the large pyriform stages, so characteristic of the dog piroplasm, were not encountered. It is true that it was thought that this piroplasm in the blood of the hounds was in reality *P. canis* which had become modified by the action of the trypanblau, but this view had soon to be abandoned when the parasite was recovered from the blood of country-bred dogs, which had been inoculated with the blood of an infected hound. Lastly, the parasite was found in the blood of a jackal, and it was later recovered from the blood of clean dogs inoculated from this jackal. There could then be no doubt regarding its origin. We had then to deal with an entirely new piroplasm and a new disease of economic importance.

Although the hounds of the Madras Hunt are known to have suffered from some form of piroplasmosis, it was only in the 1909-1910 season that the disease was accurately diagnosed and the true nature of the parasite recognised. Knowing that this piroplasm is almost certainly transmitted from the jackal to the hounds by the bite of a tick, one of us (W. S. P.) has made repeated attempts to try to transmit it by placing ticks from jackals on clean dogs. So far, *Haemaphysalis bispinosa* has been used, and although a large number have been placed on young dogs, we have so far failed to infect them. We have long known that there is a species of *Rhipicephalus* which is fairly common on the jackal, but unfortunately we have so far failed to obtain suitable specimens for our transmission experiments, a batch of young adults having been lost by an assistant in 1910. This *Rhipicephalus*, Professor Neumann informs one of us, is a new species allied to *Rhipicephalus simus*. We are now making another attempt to obtain this tick, and we hope, in due course, to find out whether it is the natural carrier of the parasite; it is most difficult to get jackals with ticks on them. This is one of the reasons why one of us (W. S. P.) has not given a more complete account of *Piroplasma gibsoni*, but we hope to do so in connection with some other studies on the life histories of the *Piroplasmata* occurring in South India.

Piroplasma gibsoni, and the disease it causes, are not only of interest to the student of Protozoology, but also to sportsmen, for, owing to its virulent nature, it soon disables a pack, and brings hunting to a standstill. We hope, therefore, that this report will appeal to a wide circle, and that if the parasite is found in other parts of the world, those interested in the welfare of their hounds will be able to check the disease by the use of Salvarsan. We propose, then, in this paper, recording the recent outbreak among the hounds of the Madras Hunt, and, at the same time, making a few notes on the action of Salvarsan on the parasite ; owing to other more important duties, we have not had the time to carry out any exact experiments, but we hope in due course to do so. In any case, sufficient is now known regarding the great value of Salvarsan in this disease.

The Madras hounds are imported annually from England, and are utilised in hunting jackals in the country round Madras. The kennels have been constructed regardless of cost, and every possible precaution has been taken to render them tick-proof. They contain scarcely any woodwork, and the main building, together with the several yards, are surrounded with a moat four inches wide and three inches deep, in which a solution of cyllin is always kept. No tick can possibly pass this barrier. Every hound on returning from hunting or from exercise is carefully examined for ticks, and any found are at once destroyed; this operation is carried out daily, under supervision, by the dog boys, in one of the yards, so that the animals are never permitted to enter the kennels proper until they are tick free. These details are mentioned, in order to show that any tick-borne disease must be encountered outside, and not in the kennels.

For the 1911-12 season 19½ couple were landed on October 11th, 1911, and were all in excellent condition; they were taken straight to the kennels in the hunt van. During October they were exercised along the road, and were given an occasional run across country.

All the hounds—only bitches are imported—were very fit when hunting started on November 4th. At the very commencement of hunting, jack was killed, and the hounds appeared to remain in good condition till November 28th, when several couple were noticed to be off their feed, and developed temperatures ranging between 102° F. and 104° F. The day before this change was noticed there had been a very hot run, and it was at first thought, and hoped, that the slack condition of some of the animals was due to a 'touch of the sun.' However, during the following week, on examining some of the sick hounds we noticed that they were anaemic, and that their spleens were readily palpable (the spleen of a dog is an organ which cannot be readily felt, at any rate in health). Further, the sick animals were unmistakably losing condition. From past experience it was at once evident that we had to deal with the old enemy *P. gibsoni*. On December 11th one of us (W. S. P.) took blood films from all the hounds, twenty-one couple in all, 1½ couple having arrived in the meantime from Ootacamund, and found that 15½ couple were infected with the parasite. Two days later one hound died, and at the autopsy all the signs of acute malignant piroplasmosis due to *P. gibsoni* were found. We use the term malignant because of the extremely gross changes the parasite produces in these highly susceptible animals, and further, because we know of no cure. Trypanblau, trypanrot, and almost every drug we could think of had been tried in previous years with disappointing results.

On examining the films made from the sick hounds, it was found that some were more seriously infected than others, judging from the large number of parasites. It will be unnecessary here to describe the parasite, but we would like to point out that it is easily overlooked when only a few are present in the peripheral blood. The success of the search depends on making a really good clean film, and we would strongly recommend those who may have to examine the blood of hounds for this parasite to attend to all the little details in making the film. For instance, the slides must be clean and free of grease; the needle, with which the film is made, must be dry and free of rust, and the same with the scissors required for snipping a piece of skin from the ear. It is most important to clean thoroughly the hound's ear after cutting off the hair from the tip. If these details are attended to, and the film fairly deeply stained with Romanowsky's stain, the observer will have no difficulty in finding the parasite; if, on the other hand, the slide is dirty, or the hound's ear not cleaned, the parasite will certainly be missed.

At this stage of the recent outbreak, it occurred to one of us (T. H. S.) to try the effect of Salvarsan. Accordingly, on December 14th, two hounds, one very ill and heavily infected, the other moderately so, were selected, and 0·6 gram of the drug was injected intramuscularly into the hamstrings. A fair amount of local oedema followed the injection, which eventually involved the whole leg. On December 16th, one of us examined blood-films from the two hounds, and noted that the number of parasites was about the same. Clinically the two hounds had unquestionably improved, their temperatures had fallen to normal, and they began to 'feed up,' to use a hunting phrase. On the strength of this experiment we decided to waste no more time, but inject all the hounds which were infected. Hunting was suspended, and with the assistance of Mr. F. Ware, C.V.D., one of us (T. H. S.) injected the sick hounds on December 21st and 22nd. Before recording the result of this experiment, it will perhaps be useful if we give a short account of the disease as it strikes the lay mind.

The first symptom which is evident, is the intense anaemia which clearly points to the great destruction of the red blood cells. This symptom explains the first sign which the huntsman will notice in the incipient stage of the disease, namely, slackness of the hound in cover, and inability to keep her usual place in the field when the pack is running. We have always been able to pick out the sick hounds when hunting, and later have found the parasite in their blood. Next, the spleen enlarges and the hound loses condition rapidly; it should be noted that in a dog the spleen, when it enlarges, does so by increasing in length more than in its transverse diameter, so that it comes to resemble a big tongue-like organ extending across the abdominal cavity even into the right iliac fossa. In one case the spleen was found doubled on itself. It is very difficult to feel this great enlargement of the organ with one hand; the best way is to grasp it crossways between both hands, no mistake can then be made as to the presence of the enlargement. The liver also hypertrophies, but not to the same extent as the spleen. In spite of the enormous destruction of red blood cells, we have never seen haemoglobinuria. Pyrexia is usually present, but only well marked shortly before death. Several of the hounds developed large sloughing sores along the floor of the mouth and inside the cheek, closely simulating cancrum oris, which is so well known in Kala Azar.

After the injections of Salvarsan mentioned above, the hounds picked up in every way. Their spleens slowly diminished in size, the anaemia was less and less noticeable, till in a few weeks it disappeared altogether. They put on flesh, and after hunting had been suspended for three weeks it was resumed, and continued till February 22nd, 1912. At the last meet of the season sixteen couple were out and killed a jack in the open after a fifty-five minutes' run without a check. We mention this remarkable feat in the case of hounds which only a few weeks previously were extremely ill, in order to show the extraordinary effect of a single dose of Salvarsan.

The blood of the hounds was examined as often as was possible, and it was found that the parasite in the case of those which were previously heavily infected was present in small numbers; in the moderately infected hounds it was almost impossible to find a single parasite. We regret that this part of the work is far from being complete, and we fully recognise that much has yet to be learnt regarding the action of the drug on the parasite; we hope to fill in the gaps in due course. One of the hounds, which was the first to be injected with Salvarsan, and which was at the time seriously ill, has been kept at the King Institute, and repeated examination of its blood has failed to show a single parasite. We have no doubt whatever that had this animal not been treated with the drug it would have died in a few days.

We must, however, note that some of the hounds died in spite of the treatment, and we will now give a few notes regarding them. Vixen (see chart IV) and Discord died before we started the treatment. Flourish (see chart I), who was very ill at the time, being extremely anaemic, died four days after the injection. Rhapsody, moderately infected, died of double pneumonia, as was seen at the autopsy. Curious (see chart II) undoubtedly died as a result of the disease, and as in the case of Flourish, the drug was evidently given too late. Amy died of diffuse cellulitis of the neck, and at the autopsy no piroplasms could be found in her spleen, the drug having obviously destroyed them. It will be remembered that the spleen usually contains the parasite in large numbers. Ruby died of dysentery, probably following colitis set up by the disease. This makes a total of 3½ couple, of which 1½ may be put down as having died of complications, and of piroplasmosis. It leaves two couple, one hound of which died of pneumonia, and the other of cellulitis of the neck. Out of the 17½ couple left in the kennels, 12½ were found by blood examinations to be absolutely free of the disease, while five couple which originally were infected still showed a few parasites in their blood, but they had obviously recovered.

As far as we know, this is the first time in which salvarsan has been used in the case of an outbreak of piroplasmosis in a large hunting pack, and we think the extraordinary result is of sufficient interest to merit its being placed on record. In the case of the Madras Hunt, it was becoming a question, even if it had not already become so, as to whether it was advisable to go on hunting in view of the serious losses incurred. Except in the case of one couple, who did not respond rapidly to one dose of the drug, and which were given a half dose thirty days later, we have shown that one injection of 0·6 gram appears to be all that is required. The great drawback to the treatment is the high price of the drug, and we hope that ere long it will be sold at a lower rate, especially when required for animals such as hounds.

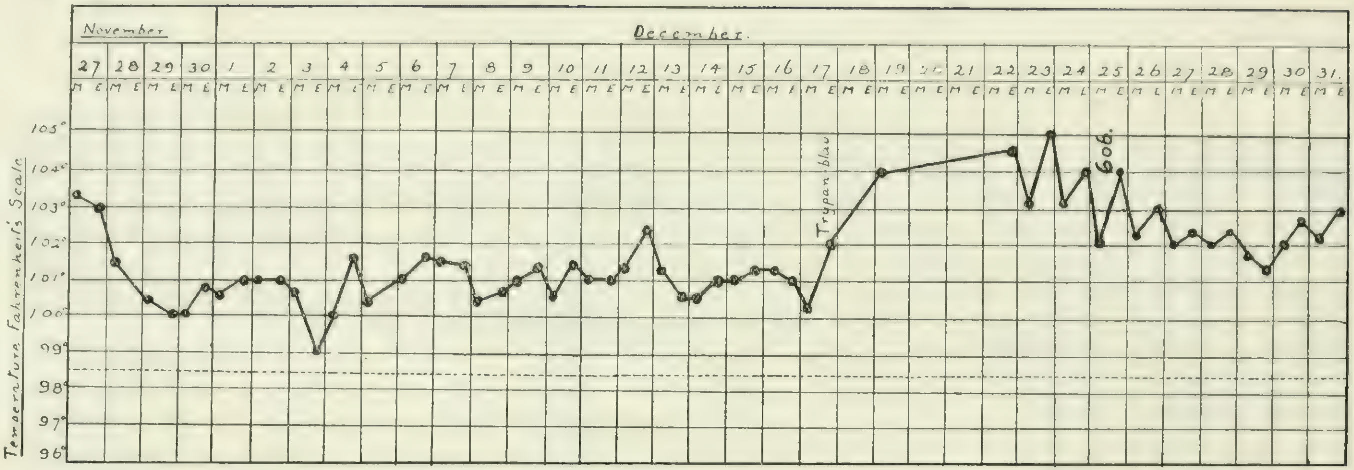
On referring to the temperature charts (pp. 368-370) it should be noted that a dog's normal temperature is about 101°F.

REFERENCE

PATTON, W. S. (1910). Preliminary Report on a new piroplasm *Piroplasma gibsoni*, sp. nov., found in the blood of the hounds of the Madras Hunt and subsequently discovered in the blood of the jackal *Canus aureus*. *Bull. Soc. Path. exot.* tome 3, No. 4.

Name—'Flourish.'

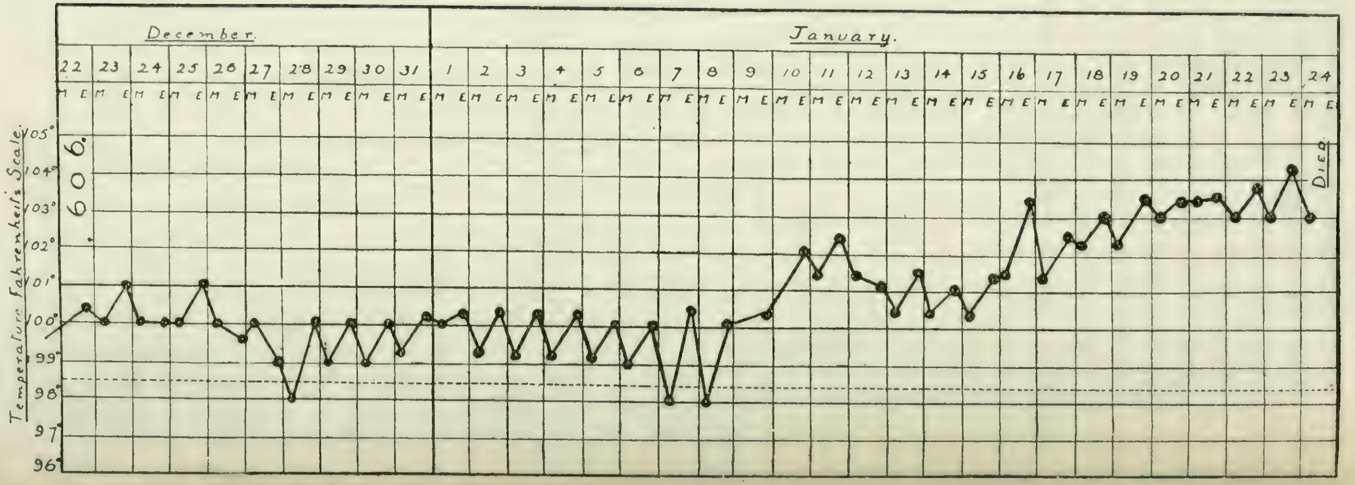
Chart No. I



This hound showed rapid wasting, marked anaemia, great enlargement of the spleen and had stomatitis as a complication; it was given 6 grammes Salvarsan on December 25. It had a dose of Trypanblau on December 17. After the dose of 606 it picked up and came out for its food, which it had not done before. It, however, got worse on December 30 and died the next day.

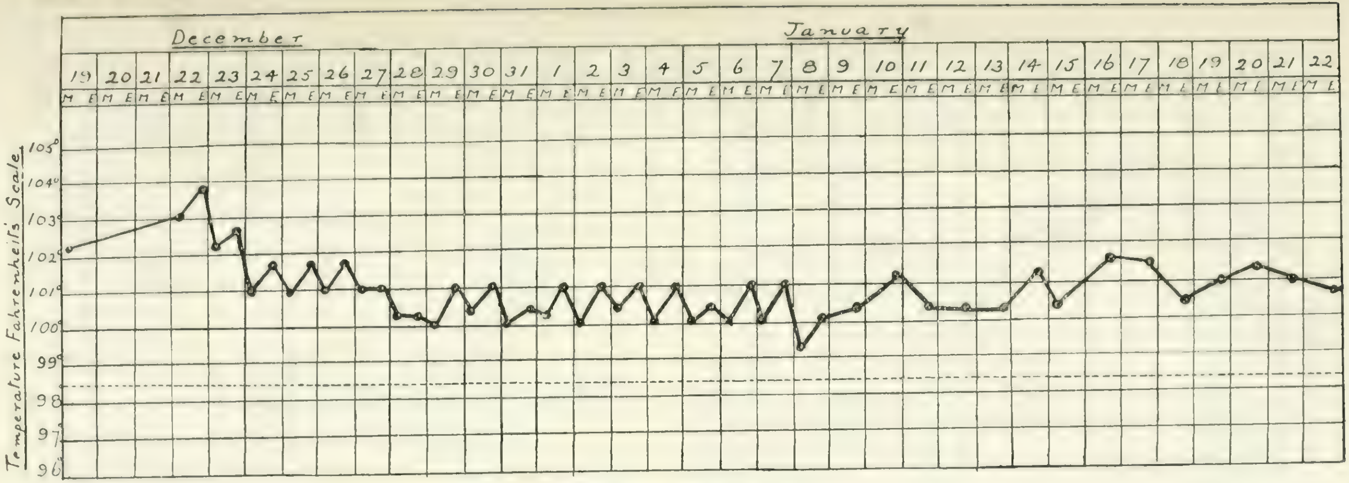
Name—'Curious.'

Chart No. II



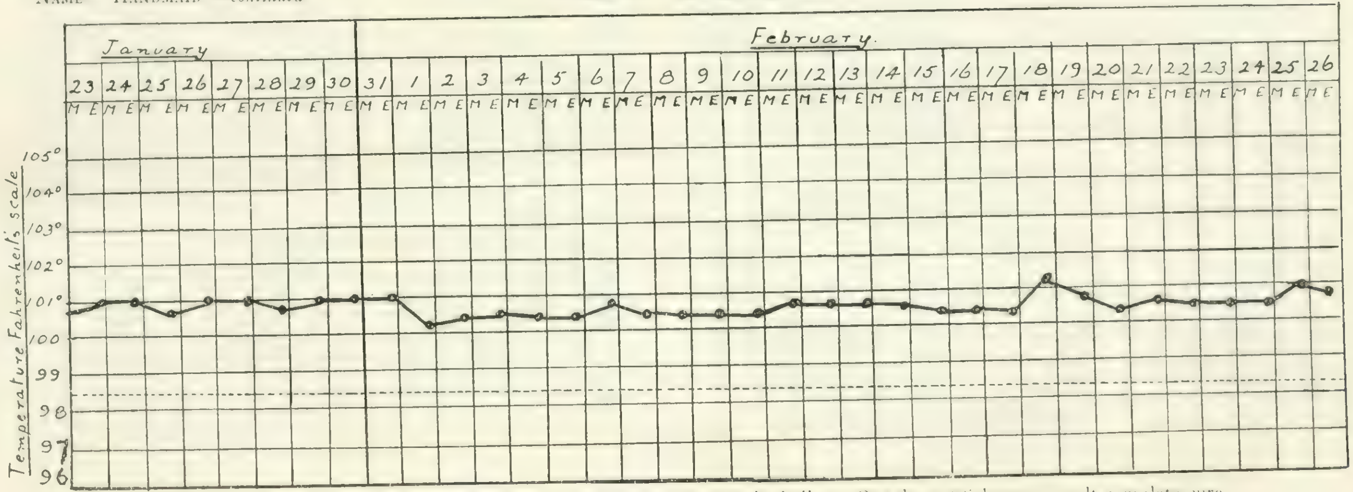
NAME—'HANDMAID.'

CHART No. III



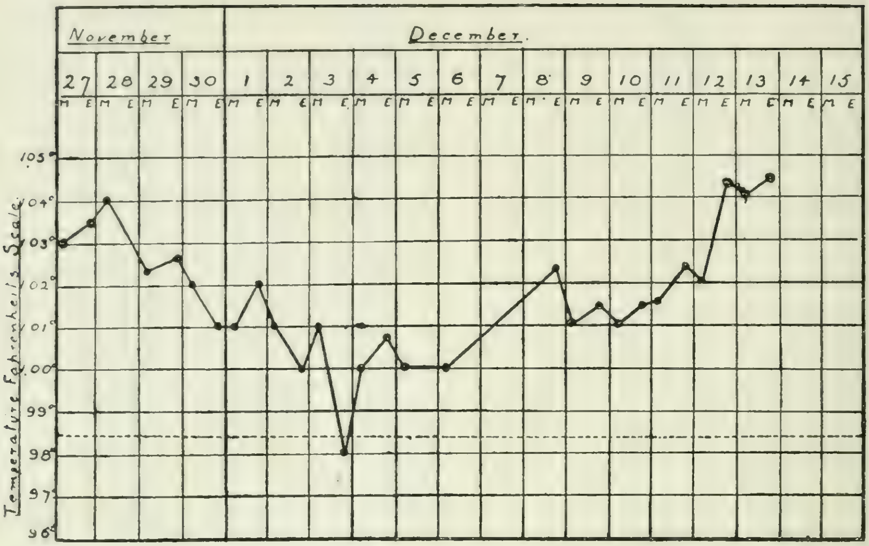
NAME—'HANDMAID'—*continued*

CHART No. III—*continued*



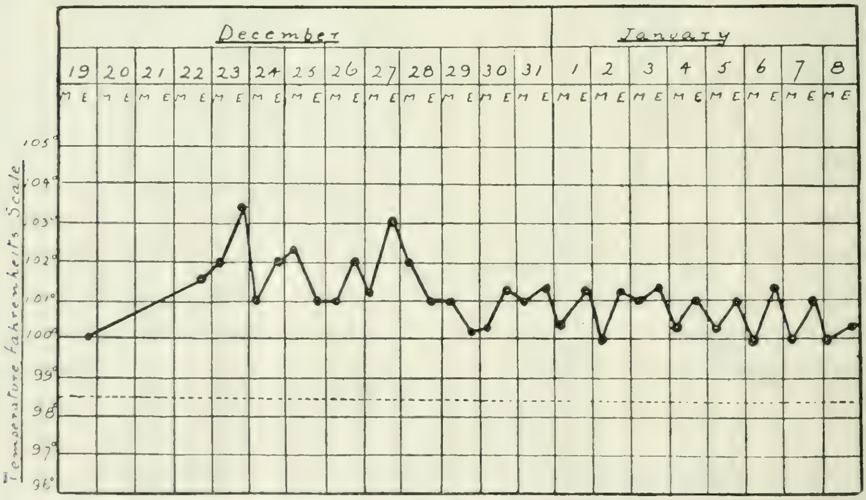
Hound considerably wasted, anaemia marked, spleen extended to right in nipple line. One dose of Salvarsan, result complete cure.

Name—'Vixen.' Chart No. IV



Marked and rapid wasting, great anaemia, spleen enormously enlarged, liver considerably so. 606 not given, result death.

Name—'Charmer.' Chart No. V



Marked anaemia, spleen enlarged up to mid-line, condition fair, considerable lassitude. One dose of 606, result cure.